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# ENVIRONMENTAL Fact Sheet

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WD-DWGB-3-15

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## Taste and Odor in Drinking Water

Taste and odor, at objectionable levels, occur in approximately 10-15 percent of water wells in New Hampshire. Hydrogen sulfide odor (rotten eggs) is reported most often, however, this fact sheet discusses taste and odor contaminants **other than** hydrogen sulfide. For information on hydrogen sulfide, please see fact sheet WD-WSEB-3-16 "Hydrogen Sulfide in Drinking Water" at [www.des.nh.gov/organization/commissioner/pip/fact-sheets/dwgb/index.htm](http://www.des.nh.gov/organization/commissioner/pip/fact-sheets/dwgb/index.htm).

In **groundwater** supplies, the origin of taste and odor contaminants generally cannot be determined. The principal causes of taste and odor are thought to include:

- Recharge of the well by water originating from wetland type areas.
- Chemical reactions between various minerals in soil or rock, possibly enhanced by the actions of various natural occurring nonhazardous bacteria in the soil.
- Manmade contaminants inadvertently entering the soil.

In **surface water**, taste and odor problems typically are attributed to algae and dissolved organic matter; however, these problems are generally rare in New Hampshire. The most common taste and odor by-products are 2-methylisoborneol and geosmin. The DES Laboratory does not test for either of these factors. DES strongly cautions against the use of **unfiltered**, undisinfected surface water for drinking purposes.

### LABORATORY TESTING

The characterization of odor is often very difficult because taste and odor identification generally is very subjective. The DES Laboratory does not generally characterize odors in drinking water samples. However, the laboratory can test for particular elements or compounds **thought to cause** a particular taste and odor condition.

If you desire to identify the compound(s) that are creating taste and odor you should recognize that this will be a difficult process with a low likelihood of success (other than for the compound hydrogen sulfide). First, you will need to decide what contaminant(s) are believed to cause the taste and odor. Then have the laboratory test for that factor(s). If that factor is present at elevated levels, then that factor probably contributes to the overall problem. If it is not present at meaningful amounts, the hypothesis will need to be revised and laboratory tests processed for these new compounds. Please see page 3 for some, but by no means all, taste and odor causing compounds.

## **MANMADE CAUSES**

Occasionally, taste and odor can indicate the presence of serious health related contaminants such as those from industrial chemicals. These are often associated with land uses such as landfills and industrial areas. In years past, these chemicals were also associated with “mid-night dumping” in rural areas. To determine the presence of these contaminants, very expensive laboratory testing is typically required. Whether there is sufficient justification for such testing would require an evaluation of the area nearby and uphill of your well.

## **HEALTH SIGNIFICANCE**

Until the factor(s) creating the taste and odor is identified, an assessment of health significance of taste and odor cannot be made. When a well shows a noticeable and rapid change in taste and odor characteristics, after a long history (at least two to three years) of stable quality, the safety of the water source should be questioned and laboratory testing performed. Some wells have seasonal variation in taste and odor characteristics. If occurring every year, these would likely imply a condition of natural origin with lower risk.

## **TREATMENT**

Taste and odor characteristics generally can be removed from drinking water. The most common treatment options are listed below.

**Aeration:** In this process, large volumes of air are blown through the water. The taste and odor factors volatilize into the air bubbles. This air is vented to the outside of your home similar to the way moist, lint-laden air vents from a clothes dryer.

An important requirement of this method is the need to have clean air, free of dust, mosquitoes, etc. The principal disadvantage of aeration is the possibility of creating bacterial growth in the treated water and the high cost of the aeration equipment. See DES fact sheet WD-DWGB-2-23 for information on aeration treatments. Aeration is also beneficial in removing radon gas and carbon dioxide, which can make water acidic, thus dissolving lead and copper from your plumbing. See also fact sheet WD-DWGB-3-4. The web address for all DWGB fact sheets is at the end of this document.

**Oxidation:** In this method, an oxygen-like chemical (such as oxygen, potassium permanganate, ozone or chlorine) is added to the water. The oxygen-like chemical reacts with the odor compounds and is chemically destroyed. One variation on this process uses a venturi nozzle to small amounts of ordinary air to the water. Oxygen in the air reacts with the contaminants and the remaining air is removed from the water by an air relief valve. This system generally offers good service at low cost.

**Adsorption:** In this process, the raw water is passed through activated carbon. The carbon can be granular or a “pressed block.” The taste and odor components adsorb (stick) to the interior surface of the carbon particles as the water passes through. Activated carbon may not fully remove certain taste and odor factors. Further, where radionuclides are high, adsorption of radon, uranium, radium and others radionuclides may create a low level radionuclide waste and/or a source of radiation within the home.

## CHOOSING THE TREATMENT PROCESS

Taste and odor treatment can be somewhat experimental. Typically one method will be tried to see if that method works for your particular taste and odor type. If not, another method from those above will be tried. Experienced water treatment professionals will know which option to try first.

Where the taste and odor characterization is unusual, a so-called “pilot-size treatment process” could be tried. This approach allows the treatability of the taste and odor to be determined easily on a small scale device before major effort and expense is committed to installing the full size treatment device.

Often the laboratory will not be able to identify any of the contaminant(s) which likely would cause taste and odor. In such cases a treatment device, often activated carbon, will be installed at least at the kitchen sink with the hope of lowering the concentration of the unknown contaminant. In such situations the water is not necessarily thought of as pure, but the treatment is seen as improving an unacceptable poor situation.

## TASTE AND ODOR REFERENCES

Shown below are common taste and odor characterizations and the contaminants that may cause them. The principal references for this list is: Taste and Odor in Drinking Water, American Water Works Research Foundation Report, ISN 0-89867-864-1, 1996.

### ODOR OR TASTE CHARACTERIZATIONS & POSSIBLE CAUSES

CHARACTERIZATION	POSSIBLE CAUSE	LABORATORY TESTS
Metallic Taste	Metals in soil or rock	Iron and manganese
Sour, salty	From corrosive water	Lead and copper
Rotten eggs	Hydrogen sulfide	Hydrogen sulfide (need special bottle)
Musty	Generally harmless	2 Methylisoborneol, chloroanisole
Earthy	Organic material	Geosmin
Potato bin-musty		Isopropyl methoxy pyrazine
Woody-earthy		Cadinene-ol
Cucumber	Algae	Trans-2, cis-6 nonadienal
Fruity, fragrant	Ozone	Aldehydes (greater than C <sub>7</sub> )
Fishy	Algae, diatoms	n-hexanal; n-heptanal, Hepta- and decadienals
Cod liver oil		decadienals
Mothballs	Industrial solvents	Volatile organics
Salty	Sea water, road salt	Sodium/chloride
Earthy	Cyanobacteria (blue-green algae)	Geosmin
Medicinal	Reacted chlorination	
Chlorine	Chlorination	

## FOR ADDITIONAL INFORMATION

Please contact the Drinking Water and Groundwater Bureau and the New Hampshire Water Well Board at (603) 271-2513 or [dwgbinfo@des.nh.gov](mailto:dwgbinfo@des.nh.gov) or visit our website at [www.des.nh.gov/organization/-divisions/water/dwgb/index.htm](http://www.des.nh.gov/organization/-divisions/water/dwgb/index.htm). All of the bureau's fact sheets are on-line at [www.des.nh.gov/-organization/commissioner/pip/factsheets/dwgb/-index.htm](http://www.des.nh.gov/-organization/commissioner/pip/factsheets/dwgb/-index.htm).

Note: This fact sheet is accurate as of September 2008. Statutory or regulatory changes or the availability of additional information after this date may render this information inaccurate or incomplete.